FIELDIANA · GEOLOGY

Published by

CHICAGO NATURAL HISTORY MUSEUM

Volume 10 JANUARY 23, 1947 No. 3

A NEW ANOSTEIRINE TURTLE FROM MANCHURIA

RAINER ZANGERL

CURATOR OF FOSSIL REPTILES

The Department of Geology (Division of Vertebrate Paleontology) of Chicago Natural History Museum has acquired a small, fossil turtle through the courtesy of Mr. Tokumatsu Ito, formerly of the Department of Anthropology, who presented it to the Museum in 1935 as a gift from the collector, Mr. K. Ogaki. The label states that the specimen came from the Fu-schun coal mine, near Fu-schun, province of Fengtien, Northeast Provinces (Manchuria).

Although the extensive coal deposits, coaly shales, and oil shales of this mine have been the subject of several geological reports (see Uwatoko, 1930) and have furnished a considerable amount of fossil plant material, described by Palibin (1906), Florin (1922), and Endô (1934), I have failed to find any reference to vertebrate remains from this locality.

The determination of the age of the coal deposits of Fu-schun apparently rests entirely on paleobotanical evidence. Florin tends to consider the beds as of Oligocene age, whereas Endô, on the basis of more material, concludes that they are of late Eocene age. The latter determination is strengthened by the recognition of an anosteirine turtle that is morphologically close to *Anosteira ornata* and *Anosteira mongoliensis*, both of which are late Eocene forms.

Order **Testudinata**

Family **Dermatemyidae**

Subfamily **Anosteirinae**

Anosteira manchuriana sp. nov.

Holotype.—Chicago Natural History Museum No. P15102, carapace and plastron. The specimen is somewhat flattened in the dorso-ventral direction. The costal plates of the left side of the shell presumably retain their original curvature, but, together with the

neurals, are thrust upon the proximal ends of the right costals. Considerable portions of the costal plates of both sides are broken away, but they have left sharp impressions in the matrix (fig. 7). All of the peripheral bones are missing. The plastron is beautifully preserved except for the distal ends of the hyo- and hypoplastra (fig. 8). The matrix is a fairly soft, bituminous shale (oil shale?) of exceedingly fine grain. The bones are well preserved, showing the finest details of surface sculpture.

Horizon and locality.—Late Eocene. Fu-schun coal mine, province of Fengtien, Northeast Provinces (Manchuria), probably from the oil shale horizon.

Diagnosis.—Nuchal plate much wider than long, apparently convex in front, posteriorly excavated for the reception of the front end of the first neural. Epiplastra elliptical in outline; lateral edges of xiphiplastra converging caudad to form a sharp point. Small fontanelle between hyoplastra and entoplastron.

With the exception of the over-all outline of the shell and the structure of the peripherals, the morphology can be made out satisfactorily (figs. 5 and 6). On the whole, this species strongly resembles *Anosteira ornata* Leidy from the Bridger Eocene of North America, of which a good shell was figured and described by Hay (1908). The similarity is particularly great in the surface sculpture, on the basis of which the two forms could scarcely be distinguished.

The nuchal plate is only partially preserved; its general shape, however, can be determined by a clear impression left on the matrix. Its anterior margin appears to be curved ventrad, and its outline, in dorsal aspect, is that of a yoke. Neurals 1–6 are hexagonal, Nos. 1, 4, and 6 being the widest. The posterior sutural delimitation of the seventh neural is uncertain. An almost circular eighth neural is located between the seventh and eighth pairs of costals. The seventh costal plates are exceptionally wide. This entire region of the shell is very different from any other anosteirine turtle so far described, but the frequency of anomalies in the posterior (particularly the sacral) region of shells of recent pond turtles (e.g. *Chrysemys picta*) strongly suggests caution in the interpretation and evaluation of differences of this kind. For this reason these "distinguishing" characters were omitted from the diagnosis of the present species.

The shield furrows are delicate but clearly visible under suitable lighting. In the specimen (fig. 7), these scale imprints are not continuous across adjoining plates, because of a moderate disarrangement of the latter. On costal plates Nos. 2 to 6 the ornamentation

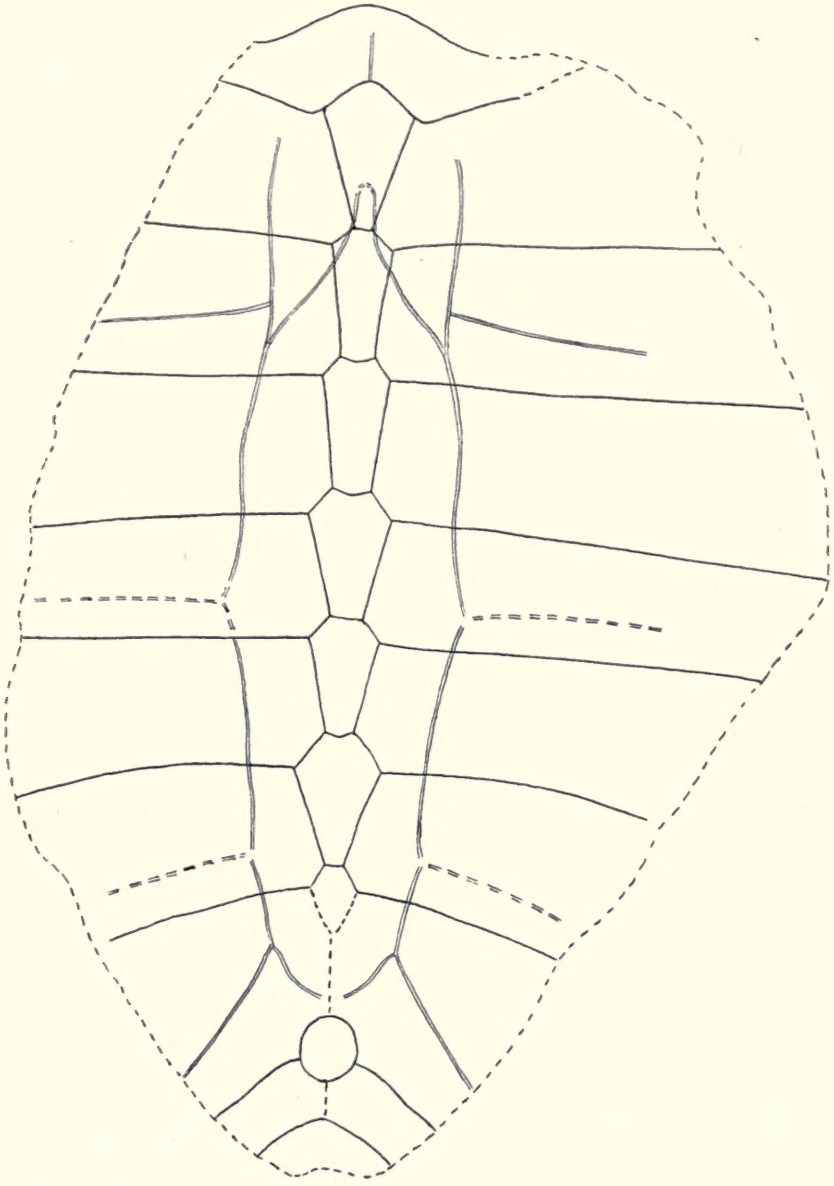

FIG. 5. Partially reconstructed carapace of *Anosteira manchuriana* sp. nov. × 1.8.

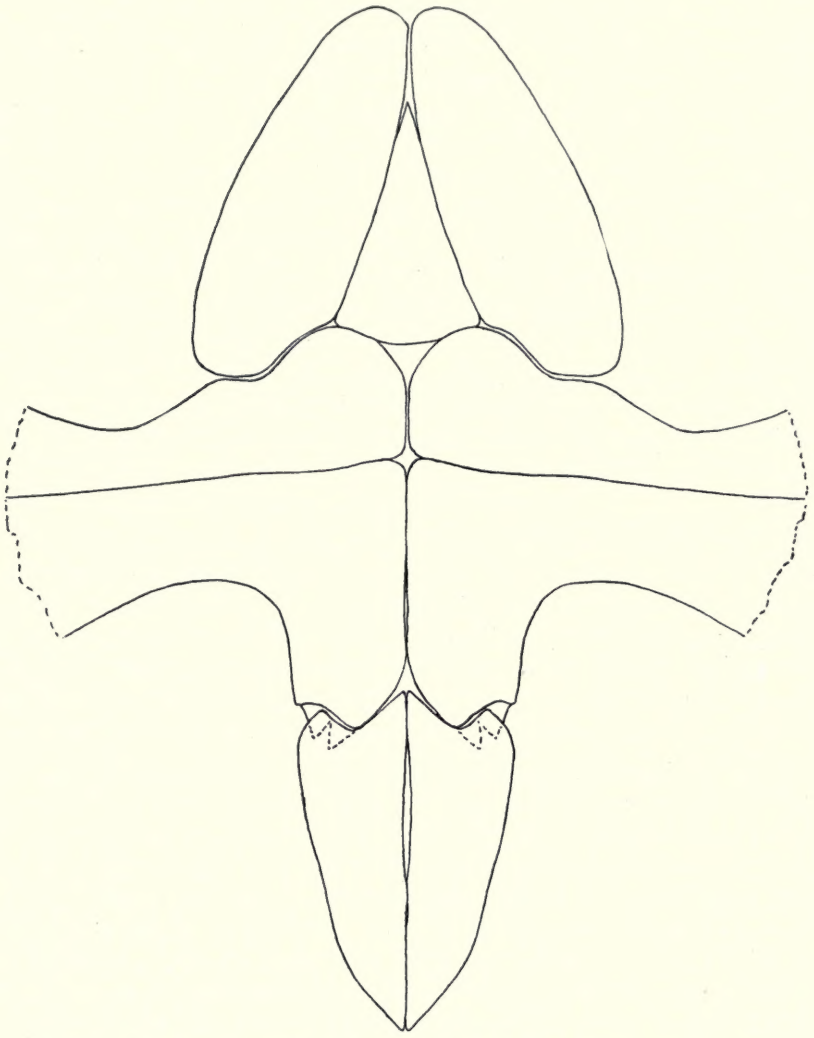

FIG. 6. Reconstruction of plastron of *A. manchuriana* sp. nov. × 1.8.

consists of longitudinal, irregular ridges and valleys, the larger ones lying next to the neurals. Costals Nos. 1, 7, and 8, the nuchal and suprapygal, are covered with fine pustules and depressions. The neurals are fairly smooth.

All elements of the plastron are present. The left epiplastron could not be brought to view entirely without destruction of the imprint of the costal plates on the opposite side of the specimen. The

left postero-lateral corner of the entoplastron is hidden below the hyoplastron and the lateral half of the latter lies buried below the hypoplastron. As in the American Museum specimen (No. 6132) of *Anosteira ornata* (Hay, 1908) and in *A. mongoliensis* Gilmore, the sutures between the plastral elements are not (or are very weakly) serrated, in contrast to those of *Pseudanosteira pulchra* Clark.

MEASUREMENTS

(In millimeters)

Greatest length of specimen	85
Greatest width of specimen (at level of third costal plates)	57
Width of nuchal plate	24+
Length of nuchal plate (at midline)	9

Neural Plates

No.	Length	Greatest width	Width at anterior suture
1	11.0	6.5	6.5
2	10.0	5.0	2.0
3	9.6	5.0	3.3
4	9.0	5.4	2.8
5	±9.0	±5.0	2.6
6	9.0	5.8	2.5
7	?5.0	4.0	1.8
8	6.4	5.0	—

Widths of Costal Plates at Proximal Ends*

No.	Left side	Right side
1	12.0	13.0
2	9.4	9.4
3	9.2	9.2
4	?9.2	9.2
5	....	9.3
6	8.0	8.0
7	12.8	12.5
8	4.5	4.5

* The exact lengths of the costal plates cannot be determined, but costals Nos. 3 and 4 may be estimated at about 37 mm.

Plastron

Length of epiplastron	30.0
Greatest width of epiplastron	11.4
Length of entoplastron	17.0
Width of entoplastron at posterior end	10.5 (est.)
Length of hyo- and hypoplastra along suture	28+
Greatest width of hyoplastron	10.5
Least width of hyoplastron	4.0
Greatest width of hypoplastron (excluding posterior "teeth")	17.0
Least width of hypoplastron	6.6
Width of hypoplastron along medial suture	15.3
Length of xiphiplastron along midline	22.8
Greatest width of xiphiplastron	8.0
Width of posterior plastral lobe at base	17.0

Comparison with other species.—To date, the following closely related anosteirine turtles have been described:

Anosteira ornata Leidy, *A. radulina* Cope, *A. anglica* Lydekker, *A. mongoliensis* Gilmore, and *Pseudanosteira pulchra* Clark. To this list should possibly be added *Pseudotrionyx pulchra* Dollo.[1]

Anosteira ornata, A. mongoliensis, and *Pseudanosteira pulchra* are known either from complete shells or large portions of shells; the rest are based on isolated fragments. On the basis of what is known in all three of the better-known forms (the nuchal, hyo-, hypo-, and xiphiplastra), *Anosteira manchuriana* and *A. ornata* appear to be closer to each other morphologically than either is to *A. mongoliensis.* However, we have only incomplete knowledge of the Mongolian species. *A. manchuriana* differs from the other two forms in the apparently convex anterior rim of the nuchal plate.

A comparison of *A. ornata, A. manchuriana,* and *Pseudanosteira pulchra* is of considerable interest. The most peculiar feature of the genus *Anosteira* is the extreme reduction or fusion of the vertebral shields. The first appears to be paired, and extends from the middle of the nuchal bone back to the second or third pair of costal plates. The second, third, and fourth vertebral shields are fused into one long and slender scute wedged anteriorly between the paired first shields and reaching forward to the first neural plate. The fifth vertebral shield is normal. *Pseudanosteira* represents a more primitive condition, since vertebral shields 2, 3, and 4 are separate elements, though greatly different in size.

In *A. ornata,* the furrow of vertebral shield 2+3+4 is broadly rounded in front and does not touch neural plate No. 2. In *Pseudanosteira,* vertebral shield No. 2 is anteriorly pointed and its margin touches the antero-lateral corners of neural plate No. 2. *A. manchuriana* holds an intermediate position; the fused shield 2+3+4 is acutely rounded in front, and the furrow crosses the antero-lateral corners of the second neural plate. The paired vertebral shields No. 1 do not reach back to the third costal plates, as they do in *A. ornata* and *Pseudanosteira pulchra,* but only to the second. Also, the fused vertebral shield 2+3+4 is wider than in *A. ornata,* particularly in its anterior third. The hind margin of costal shield No. 4 lies on costal plate No. 7 in the Chinese species, whereas it is situated, for the most part, on the eighth costal plate in *A. ornata* and entirely

[1] Hay (1908) thinks that *Pseudotrionyx* might belong to the Anosteirinae, although a re-examination of the type material will be necessary to decide the matter.

FIG. 7. Unretouched photograph of carapace of *A. manchuriana* sp. nov. × 1.8.

FIG. 8. Unretouched photograph of plastron of *A. manchuriana* sp. nov. × 1.8.

on this plate in *Pseudanosteira*. This difference, however, is perhaps of little importance, for it may be correlated with the probable regional irregularity (see above) of the bony shell.

The proportional differences in the plastra of the better-known anosteirine turtles are given in the following table.

	A. ornata	*A. mongol.*	*A. manch.*	*P. pulchra*
Greatest width of hypoplastron (mm.)	21	21	17	32
Indices*				
A=least width of hypoplastron	42.8	42.8	38.8	46.8
B=greatest width of hyoplastron	52.4	52.4	61.7	56.2
C=least width of hyoplastron	16.6	16.6	23.5	25.0
D=length of xiphiplastron	128.0	142.0	134.0	....
E=proximal width of xiphiplastron	47.6	45.2	47.0	56.2
F=length of epiplastron	18.5	.....	17.6	....
G=length of entoplastron	85.7	.....	100.0	....

* Values A to G $\times$ 100/greatest width of hypoplastron (parasagittally).

REFERENCES

CLARK, JOHN

1932. A new anosteirid from the Uinta Eocene. Ann. Carnegie Mus., **21**, pp. 161–170, 2 figs.

DOLLO, M. L.

1886. Première note sur les Chéloniens du Bruxellien (Eocène moyen) de la Belgique. Bull. Mus. Roy. Hist. Nat. Belgique, **4**, pp. 75–96, 2 pls.

ENDÔ, SEIDÔ

1934. The geological age of the Fu-shun group, South Manchuria. Proc. Imp. Acad. Japan, **10**, pp. 486–489, 1 fig.

FLORIN, RUDOLF

1922. Zur alttertiären Flora der südlichen Mandschurei. Pal. Sinica, (A), **1**, pp. 1–45, 3 pls.

GILMORE, C. W.

1931. Fossil turtles of Mongolia. Bull. Amer. Mus. Nat. Hist., **59**, pp. 213–257, 29 figs., 11 pls.

HAY, O. P.

1908. The fossil turtles of North America. Carnegie Inst. Wash. Pub., **75**, iv+568 pp., 704 figs., 113 pls.

LYDEKKER, RICHARD

1889. Catalogue of the fossil Reptilia and Amphibia in the British Museum. Part 3: Chelonia. London, xviii+239 pp., 53 figs.

PALIBIN, J. W.

1906. Fossile Pflanzen aus den Kohlenlagern von Fu-schun in der südlichen Mandschurei. Verh. Kais. Russ. Min. Ges., (2), **44**.

UWATOKO, KUNIO

1930. The oil shale deposit of Fu-shun, Manchuria. Jour. Fac. Sci. Hokkaido Imp. Univ., (4), **1**, pp. 113–205, 38 figs., 13 pls.